REMARKS/ARGUMENTS

Upon careful and complete consideration of the Office Action dated August 13, 2003, applicant has amended the specification and claims which, when considered in conjunction with the comments herein below, are deemed to place the present application into condition for allowance. Favorable reconsideration of this application, as amended, is respectfully solicited.

Unless otherwise noted below, the amendments made to the specification and claims are based on errors occurring as a result of the translation of the originally filed Japanese PCT application into English. A proper certified translation of the Japanese PCT application is still being prepared and will be submitted in a supplemental response as soon as it is received. It is respectfully submitted that no new subject matter has been added to that contained in the PCT application as originally filed.

The Office Action initially reviewed and commented upon applicant's previously filed amendments and arguments. Although the Examiner acknowledged that the data in the subject specification shows a significant difference in percent water absorption for the examples compared with the comparative examples, the Examiner indicated that comparative example 1 could not be considered to be representative of the JP '183 disclosure because no persulfate initiator was used in comparative example 1. It is respectfully submitted that due to an error in translating the originally filed Japanese PCT application into English, the fact that 30 mg of potassium persulfate was in fact used in Comparative example 1 was inadvertently omitted. Applicant has amended page 32 of the subject specification to include the potassium persulfate component. As support for this amendment, applicant is presently preparing a certified translation of the originally filed Japanese version of the PCT application and will submit same as soon as it is completed. It is respectfully submitted that comparative example 1 was intended by applicant to

correspond to the JP '183 disclosure. It is further noted that although the potassium persulfate was inadvertently omitted from the comparative example due to the translation error, the title of said comparative example 1 on line 27 of page 32 clearly indicates "using potassium persulfate".

As was stated in applicant's previous response, the claimed subject matter is directed to a method of modifying a polymeric material which encompasses two steps: an activation treatment and a hydrophilic treatment of the activated polymeric material. More specifically, the characteristics of products prepared in the present invention are as follows: the activation treatment process is to introduce functional groups containing oxygen or nitrogen, etc. into the polymeric materials (see, for example, page 7, lines 15-18 of the present specification). Examples of the Activation Treatment process include, inter alia, ozone treatment, plasma treatment, ultraviolet radiation treatment, high voltage electric discharge treatment, and corona discharge treatment. The polymer materials are oxidized by the activation process. To maximize the effect of the activation treatment, the polymer may be subjected to a solvent treatment. For example, if the polymer material does not have a large surface area, a solvent treatment is performed prior to the activation step to accelerate the activation. As a result of the activation treatment, a layer of functional groups is formed on the surface of the activated polymer materials.

In the hydrophilic polymer treatment step, the polymeric material activated by the active treatment is reacted with a hydrophilic polymer in the presence of catalysts or initiators. Thus, the catalysts or initiators promote the reaction of the hydrophilic polymer with the functional groups produced by the step of activation treatment. Consequently, a considerable number of chemical bonds can be and are formed between the hydrophilic polymers and the functional groups on the surface of the polymeric material.

The resulting material thus has a surface structure comprising two layers: an activated layer (the first layer) and a hydrophilic layer (the second layer) bound to the first

layer. As a result, the resulting polymeric material has hydrophilic properties. For example, it has a high water absorptive property. This process enhances the water absorptive property of the resulting polymer.

The hydrophilic polymer used in the present invention contains several functional groups such as, hydroxyl groups to react with a polymer material. When an activated polymer material is treated by a hydrophilic polymer in the presence of a catalyst or initiator under conditions effective to produce the modified polymer, in accordance with the present invention, a cross-linking reaction occurs, creating a cross-link between the functional groups in the polymer material and those in the hydrophilic polymer. (Such a reaction between polymers is usually referred to as "a polymer reaction"). See, for instance, Table 1 on page 36 of the present specification showing a durability of the specimens prepared by the present process as opposed to those specimens prepared in the comparative examples. The specimens prepared by the present process are resistant to several severe washings with boiling water containing a detergent in accordance with the washing fastness test. This shows that there are many binding points formed between the hydrophilic polymer and the activated polymer material (substrate). On the other hand, when a representative prior art specimen, such as the product of Comparative Example 1, which was a non-woven fabric of JP67183(1993), was subjected to severe washing with boiling water, containing a detergent, in accordance with the severe washing fastness test, it could not resist the many thermal treatments, indicating that there are very few binding points between the polymer and the graft polymer. The hydrophilic polymer treatment in the present invention is thus different from a polymer coating or a graft polymerization in the prior art.

Apart from the correction made to comparative example 1, applicant also wishes to point out that in Example 17 of the present application, the modified polypropylene film obtained by the ozone treatment and the hydrophilic polymer treatment with potassium persulfate gave a water absorption of 52%. On the other hand, in Comparative Example 4,

the same polypropylene film as in Example 17 was treated by the method according to the JP'183 disclosure and the obtained film gave a low value of a water absorption of 17%.

As the specimen was a film, the water absortion percentage became lower than that of non-woven fabrics used in Example 1 and Comparative Example 4. However, the difference in the durability of the water absorption property was also observed between these polypropylene films. These facts suggest that the existence of carbonyl groups as defined in claim 28 of the present application results in the formation of a plural number of strong chemical bonds (which are not broken by washing in an aqueous boiling detergent solution) between polypropylene films and the hydrophilic polymer in the present invention.

The polypropylene non-wove fabric obtained in Comparative Example 1 and those obtained in Examples 1, 3, 4 and 6 were examined by an alkali-battery test in Example 18. The durability of the polypropylene non-woven fabric obtained in Comparative Example 1 was lower than the others.

Applicant further wishes to point out that, in general, it is impossible to analyze the difference between a hydrophilic polymer chemically bound to polypropylene materials and that coated on polypropylene materials by a simple adhesion. As an empirical judgment, the amount of chemically bonded polymer is estimated from the weight increase in a polymer substrate after an extraction in the solvent of the polymer attached to the substrate with a Soxhlet extractor for 12 hours (for example). Otherwise, the repeated washing processes in boiling water containing a detergent are carried out to see the fastness of the polymer bound to the polymer substrate as employed in the products of the present invention. This estimation of the formation of chemical bonds is available for the materials obtained in the other references. Namely, when a hydrophilic polymer is only coated on a polymer substrate, the polymer should be removed by the two or three times of washing in boiling detergent solutions. In the present examples, the weight increase in the non-woven fabrics treated by the hydrophilic polymer or the monomer grafting was not always noticeable,

because the weight increase by the chemical reaction and a removal of additives or fibers used as a binder of fibers by melting occur at the same time.

The Office Action then noted the withdrawal of the rejections of the claims based on JP 1248460, JP 11007937, JP 4136267, Janssen (4,678,838) and Zhang et al. (5,889,073), as well as the rejections of the claims based on J 11067183, J 09012752, JP 09143884, JP 4253231, Valint, Jr. et al. (6,213,604), Grobe, III et al. (6,200,626), J 07090783, and Young, Sr. et al. (5,432,000). Applicant wishes to thank the Examiner for his reconsideration of these issues and the withdrawal of said rejections.

In discussing the J '752 reference, the Office Action indicated that "[t]here is no evidence of record to show that the product obtained in the absence of an initiator or catalyst by the method taught by J '752 is significantly different from the instantly claimed product. The hydrophilic groups on the polystyrene substrate and on the hydrophilic polymer would be expected to initiate chemical bonding."

In support of applicant's previously submitted arguments, it is respectfully pointed out that the product in Example 6 of the present specification prepared by the method of the present invention gives a high water absorption property of 773% after three times of washing in an aqueous boiling detergent solution. On the other hand, the product in Example 5 of the present application was prepared in the same manner as Example 6 except that there was no use of any catalysts or initiators in the hydrophilic polymer treatment. The product in Example 5 gave a water absorption of 580% which is lower than that of Example 6. This fact suggests that the use of catalysts or initiators gives the durability of the water absorption property, namely that the use of catalysts or initiators increases the number of chemical bonds between the polymer substrate and the hydrophilic polymer and reinforces the bonding.

In addition to the above, being filed concurrently herewith is a 37 C.F.R. §1.132 Declaration by the inventor, namely Hitoshi Kanazawa, which sets forth comparative data which is believed to respond to the Examiner's concerns.

With respect to the J '752 reference, the attached Declaration illustrates the effect of the method of J '752 as compared to the present invention. The example of J '752 is shown as "Comparative Example 9" and its corresponding example based on the present invention is shown in "Example 34" of the submitted Declaration. With respect to Comparative Example 9, when the polymer coated polystyrene film was washed in boiling water, the coating layer was removed. In addition, the surface layer was pealed off in the cross cut test with an adhesion tape. In contrast, the wettability of the product of Example 34 was markedly modified and when the product was washed with boiling water, the wettability was kept as it was. It is respectfully submitted that these results support the aspect of the present invention that the hydrophilic polymer is bound to the substrate by a strong chemical bond.

In light of the above, applicant reiterates the arguments submitted in their last reply. Specifically, there is no way with the J '752 method to activate the polymer, i.e., make chemical bonds between them as in the present case. Instead, a hydrogen bond and intermolecular forces contribute to this adhesion between the polymer and the styrene sheet. Their aim was only to get a transparent polystyrene sheet coated on a hydrophilic polymer. Thus, the J '752 reference only discloses a method of coating a polymer. As such, their method is different from the process of the present invention. The reference fails to disclose treating the hydrophilic polymer in the presence of catalyst or initiators. A review of the abstract clearly discloses that no catalyst or initiator is mentioned therein. Thus, the two processes are clearly different.

As described before, in the product of the present invention, a hydrophilic polymer chain is chemically bound to the functional groups in the activated surface of the polymeric material with a considerable number of binding points. On the other hand, the polymeric

material obtained in J '752 contains only a polymer coating structure. Without carrying out the coating in the presence of catalyst or initiators, the prior art reference cannot make a structure wherein the polymeric material therein is chemically bound to the hydrophilic polymer at a number of points on the surface thereof, as in the present invention. Consequently, the hydrophilic polymer film is easily removed as demonstrated in the accompanying Declaration.

Thus, both the method and the chemical structure of the product in J'752 are different from those of the present invention.

The Office Action next addressed the J '884 reference and dismissed applicant's arguments stating that "[t]he product obtained would be expected to be encompassed by the instant claims because there is no evidence of record to show that a significantly different product is obtained in the presence of an initiator or catalyst other than the activated polymer itself.

It is respectfully pointed out that in the J '884 method, a silicone resin with functional groups such as amino groups, epoxy groups, carboxylic groups, hydroxyl groups and methacrylic groups, etc. is attached to a polymer substrate by spraying, coating or padding. The substrate is dried, heated and treated by plasma. Subsequently, the substrate is again treated with a solution of hydrophilic polymer resin by a padding-drying-curing procedure. In contrast, and in accordance with the method of the present invention, a polymer substrate is made by an activation treatment in order to form reactive groups on it to the extent that the lowering of the material strength is not observed. The substrate is reacted with a hydrophilic polymer in the presence of initiators or catalysts. As the padding-drying-curing of a silicone resin before the activation treatment is not carried out, the method of the present invention is clearly different from that taught by J '884. In order to illustrate the effect of the J '884 method, the accompanying Declaration conducted "Comparative Example 10". According to the example of J'884, the polyester fiber and polypropylene

fiber were treated with a silicone resin by the padding-drying-curing method. As is shown by the attached Declaration, the attached silicone resin to polyester fiber was completely removed after the three times of washing with boiling water and that of polypropylene fiber was removed after a washing with boiling water.

As was previously argued, in accordance with the present process, a hydrophilic polymer chain is chemically bound to the functional groups on the activated surface of the polymeric material at a number of binding points. On the other hand, in the product of J'884, there is only a physical coating, no chemical binding, at several points of the resin. The results of comparative Example 10 illustrate this point. Consequently, it is respectfully submitted that J '884 does not teach or disclose the present invention.

The Office Action then moved on to J '231 and again dismissed applicant's arguments saying that "there is no comparative evidence of record to support" applicant's allegations and that the "plasma treatment of the PTFE would be expected to provide many active sites for binding the hydrophilic polymer, in the absence of evidence to the contrary." Applicant respectfully disagrees.

J '231 discloses a highly functional film comprising a water-soluble vinyl polymer on the surface of polytetrafluoroethylene. As is taught by J '231, a plasma grafting to polytetrafluoroethylene (follow yarn or film) is carried out in the presence of a monomer (acryl amide or acrylic acid) for 30 minutes under a reduced pressure. The graft polymer was observed on the substrate with the use of scanning electron microscope, IR spectroscopy and ESCA. J '231 represents a typical plasma polymerization where a plasma irradiation is made in the mixture of a monomer and a substrate.

Regarding the present invention, on the other hand, a monomer grafting to a polymer substrate is carried out in the presence of initiators or catalysts after both steps (a) and (b). In addition, the monomer grafting step does not require the condition of reduced pressure. Based on these differences, it should be clear to the skilled artisan that the method and the

structure of the product in accordance with the present invention are quite different from that disclosed by J '231. Still even further, it is noted that in accordance with the present invention, the activation step for a polymer material is carried out in the absence of monomers, which is clearly different from the J'231 method. After the activated substrate is taken out of the apparatus, it is possible to put the substrate in air for a while. The subsequent steps of hydrophilic polymer treatment and monomer grafting can both be carried out with the substrate being allowed to stand in air for a long period of time.

The Office Action next discusses the Valint, Jr. et al. and Grobe, III et al. references and maintains its rejections concerning same. The present invention comprises (a) an activation step wherein a limited amount of carbonyl groups are introduced to the surface of the polymeric material; and (b) treating the activated polymeric material produced in said activation step with a hydrophilic polymer in the presence of catalysts or initiators. A monomer grafting step may be added after step (b). In the methods disclosed by Grobe, III et al. and Valint, Jr. et al., monomer grafting is carried out directly after the activation step. Neither Grobe, III et al. nor Valint, Jr. et al. disclose the amount of carbonyl groups introduced to the surface of the polymeric material or step (b) of the present invention. In other words, the hydrophilic polymer is introduced in accordance with the present invention by treating with hydrophilic polymer, while the two prior art methods introduce the hydrophilic polymer by monomer grafting to the hydrocarbon polymer layer of the polymer substrate.

In accordance with the typical example of Valint, Jr. et al., a substrate, silicone medical device is treated by a plasma oxidation for 20 seconds and furthermore treated by a plasma in the butadiene or methane atmospheres. The obtained polypropylene film is then heated and placed in buffer borate and autoclaved. Valint, Jr. et al. teaches that the polymer substrate coated with hydrocarbon film prepared by a plasma treatment is rendered hydrophilic by further exposure to a plasma oxidation reaction or by the attachment of

hydrophilic polymer chains.

Similarly, Grobe, III et al. disclose treating a substrate, silicone medical device in a hydrocarbon atmosphere, followed by graft polymerization with a mixture of hydrophilic monomers. In order to demonstrate the advantageous effects of the present invention as compared to the prior art, Example 35 was carried out (see page 3 of the attached Declaration). In Example 35, the treated polymer substrate initially had no formation of carbonyl groups until the method of the present invention was followed. The product obtained in accordance with the present invention as described in Example 35 possessed effective and durable properties with respect to hydrophilic property, water absorption property and adhesion property as compared with the products of Grobe, III et al. and Valint, Jr. et al.

Having addressed the Examiner's opening comments of the Office Action, applicant now turns to the specific rejections set forth in the instant Office Action. To begin with, claim 32 was rejected under 35 U.S.C. §112, second paragraph, as allegedly being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In particular, the Examiner has questioned the meaning of the term "carbon materials". Applicant respectfully submits that the phrase "carbon materials" as found in previously submitted claim 32 was referring to "carbonized polymeric materials", such as carbon fiber. Claim 32 has been amended to refer to "carbonized polymeric materials" in place of "carbon materials." Support for this maendment can be found in the first paragraph on page 6 of the subject specification. Based on the amendment made to claim 32, applicant respectfully requests that the rejection of said claim under 35 U.S.C. §112 be withdrawn.

The Office Action next rejected claims 46-59 under 35 U.S.C. §102 alleging that the "product by process claims are considered to read on prior art products that are produced by a different method wherein the product is reasonably expected to be the same in the absence

of evidence to the contrary. ...each claim, as written, requires only the presence of a polymeric material obtained by the method of claim 28."

Based on the amendments made to claims 28-31, it is respectfully submitted that the products obtained by the present invention are obviously different compared to those products of the prior art. The present invention provides significantly improved hydrophilic, water absorption and adhesion properties to its products as compared to the products of the prior art. That is, by utilizing the method in accordance with the present invention, the hydrophilic, water absorption or adhesion properties of various materials can be significantly and advantageously modified as compared to the materials of the prior art. For example, the polypropylene fabrics obtained in Examples 1 and 6 of the present application result in the product having a durable water absorption property compared to polypropylene fabrics of the prior art.

In Comparative Example 1 where an activation step is absent, the water absorption property of the product was decreased to about 35% of the initial value of the product after six times of washing in boiling aqueous detergent solution (see Table 1 on page 36 of the subject specification). In addition, the battery separator test indicated that the polypropylene fabrics modified in Examples 1 and 6 had an excellent alkali-resistance (see Table 2 on page 38 of the subject specification).

The results referred to above support the proposition that the present invention can provide modified materials with the durable water absorption property available for claims 47-52, 54, 56, 57 and 59. Further, the polypropylene non-woven fabrics modified by the same manner as shown in Examples 1-8 gave a good result for the application as a microbial culture medium in Example 19. This supports and corresponds to claim 52.

In Example 20 of the present specification, the polypropylene/polyethylene or polyethylene terephthalate non-woven fabrics prepared in the Examples 10 and 11 supported findings of durable and excellent effects for use in the application of wiping/cleaning

materials (i.e. claim 48). Similarly, in Example 21, a non-woven fabric prepared similarly to Example 3 supported an effective water retention property (i.e. Claim 51). Likewise, the polyethylene or polypropylene films prepared by Examples 13-16 showed excellent improvement in the adhesive property. Their adhesion strengths are given in Table 2. In addition, the superiority of the adhesion strength of the polymer materials obtained by the present invention from the products of the prior art were explained by a cross-cut test with an adhesive tape as described above. The excellent adhesive strength of the present products relate to claims 46, 53, 55 and 58.

Accordingly, it is respectfully submitted that the present disclosure supports the fact that the polymeric materials claimed in claims 46-59 are in fact different and superior to the products of the prior art as discussed above. Consequently, applicant respectfully requests that the rejection of these claims be withdrawn as well.

Claims 28, 32-35, 46, 48-53, 55 and 56 were rejected under 35 U.S.C. §102(b) as allegedly anticipated by U.S. Patent No. 4,743,258 to Ikada et al. (hereinafter referred to as "Ikada et al."). Before addressing Ikada et al., the present invention, as now amended in claim 28, is directed to a method of modifying a polymeric material for improving a hydrophilic property, water absorption property or adhesion property which comprises subjecting the polymeric material to an activation step wherein, when the polymeric material is polypropylene, a ratio of about 0.2 or less is observed between the absorbance at 1710 cm^{-1} due to newly formed carbonyl groups and the absorbance at 973 cm^{-1} due to methyl groups and when the polymeric material is not polypropylene, a ratio of corresponding value to the case of polypropylene is observed; and treating the activated polymeric material produced in said activation step with a hydrophilic polymer in the presence of a catalyst or an initiator under conditions effective to produce said modified polymer, wherein the weight increase of the treated polymeric material is less than 5 wt%. The amendments presently

being made to claim 28 are supported by the subject specification at page 7, line 15 to page 8, line 2 and at page 13, lines 17-24.

While Ikada et al. disclose an activation step, they do not disclose the estimation of carbonyl groups introduced by the activation step. Ikada et al. disclose the method of attachment of a hydrophilic polymer prepared by a monomer grafting to the surface of the substrate. They do not disclose the method of introducing a hydrophilic polymer directly onto the surface of the polymer substrate in the presence of catalysts or initiators in which at least a definite amount of carbonyl groups were introduced.

In Example 6 of Ikada et al. isocyanate groups were introduced in a film of ethylene/vinyl alcohol copolymer and dextran or polyvinyl alcohol are attached to the film by a urethane coupling reaction. This process does not involve the activation step of the present invention. Their coupling reaction through isocyanate groups is a well-known method to those of skill in the art and their reaction is different from the method as claimed in claim 28. It is further noted that Ikada et al. carried out the modification of a material for vascular prostheses which comprises a polymeric web as a base material. In contrast, the present invention attains the modification of the hydrophilic, water absorption and adhesion properties for polymer materials. Accordingly, the characteristics of the products are clearly different to each other.

In addition to the differences noted above, the attached inventor's Declaration compares the effects of the method taught by Ikada et al. (see Comparative Example 11) to that of the method of the present invention (see Example 36). As can be seen from the results discussed in the Declaration, the polypropylene film made in accordance with Ikada et al. had no formation of chemical bonds and after being washed in boiling water two times, the polyvinylpyrrolidone seemed to removed completely. The polyvinylpyrrolidone-grafted polypropylene film prepared in accordance with the present invention, on the other hand, showed good adhesion property to paper with a starch glue.

Based on the above comments, and the attached Declaration, it is respectfully submitted that the present invention is not anticipated by Ikada et al. and the rejection of the claims based on this reference are respectfully requested to be withdrawn.

The next rejection of the Office Action was of claims 46, 53, 55, 56 and 59 under 35 U.S.C. §102(b) based on JP 11067183. This reference was discussed earlier and the arguments submitted above are reiterated here by reference thereto. In summary, Comparative Example 1 does correspond to JP 11067183. For the reasons given above, it is respectfully requested that the rejection based on JP 11067183 be also withdrawn.

The same can be said for the next five rejections of the patent office. That is, the rejection of claims 46, 53, 55 and 56 based on JP 09012752, claims 46, 48, 50-53, 55, 56 and 59 based on JP09-143884, claims 46, 48-53, 55 and 56 based on JP 4253231, claims 46, 50, 51, 53, 55 and 56 based on U.S. Patent No. 6,213,604 to Valint, Jr. et al. and claims 46, 50, 51, 53, 55 and 56 based on U.S. Patent No. 6,200,626 to Grobe, III et al. were all discussed above. The arguments given above are reiterated here by reference thereto and it is respectfully submitted that none of the rejected claims are anticipated by any of these references. Based on the clear differences noted above, it is respectfully requested that all of the above-noted rejections be withdrawn.

Claims 46, 48-53, 55, 56 and 59 stand rejected under 35 U.S.C. 102(b) as being anticipated by JP 62019207. The Examiner noted that J'207 disclose a process for treating a hydrophobic porous film with corona discharge and further treating with a solution of polyol to afford a hydrophilic property to the film. The corona discharge treatment would be expected, it is alleged, to provide numerous active sites for chemical reaction with the polyol, thus providing a product having a hydrophilic polymer chemically bonded to the hydrophobic porous film, in the absence of evidence to the contrary.

In J'207, a polymer substrate was treated by corona discharge of 1-20W/m<2>min output for 0.1-12000 sec t <=80 deg.C. Then, the treated polymer is dipped in a solution of

polyol such as glycerin, polyethyleneglycol, polypropyleneglycol or their mixture within three hours after the corona discharge. The use of a catalyst was not described either in the corona discharge or in the polyol treatment.

The method in accordance with the present invention, on the other hand, comprises an activation step wherein a limited amount of carbonyl group is introduced to the surface of the polymeric material, followed by treating the activated polymeric material with a hydrophilic polymer in the presence of a catalyst or an initiator at a higher temperature. Furthermore, a monomer grafting step may be applied after the second step. Accordingly, the method and the durability of the hydrophilic property of the product should be very different to each other. The effects of the method of the present invention are compared to that of the method of J'207 in the attached Declaration at pages 4-5. Based on the experiments conducted and discussed in the attached Declaration, it has been shown that the method of J'207 simply provides the polymer material with a hydrophilic polymer coating. In contrast, the present invention provides real chemical linkage between the activated polymer substrate and the hydrophilic polymer.

Based on the comparative data, it is respectfully submitted that the present invention is not anticipated by J'207 and said rejection is respectfully requested to be withdrawn.

The last 102(b) rejection of the present office action is of claims 46, 48-53, 55-57 and 59 and is based on U.S. Patent No. 5,432,000 to Young, Sr. et al. (hereinafter referred to as "Young, Sr. et al."). Similar to the rejection based on J'207, the Examiner alleged that the product obtained by the process disclosed by Young, Sr. et al. would be expected to be polymeric fibers having polymeric binders chemically bound to the fibers by reaction with the oxygen functionality thereon, in the absence of evidence to the contrary.

Applicant respectfully submits that Young, Sr. et al. disclose a method to make a solidified fiber product which comprises dry discontinuous fibers by spraying a starch binder or other commercial binder in 5-20% amount by weight of the fiber, followed by depressing

and curling, and a method to adhere solid particles to the fibers with a binder. That is, Young, Sr. et al. provide a method of coating a polymeric binder to a fiber product by spraying or adhering a binder to fibers. According to example 1 thereof, as a fiber mixture contains mainly cellulose fiber, the fiber is coated with a binder containing starch or commercial binders which contain adhesives preferable for cellulose. Therefore, the Young, Sr. et al's method is different from the method of the present invention in that it fails to subject a polymeric material to an activation treatment. Further, the method of Young, Sr. et al. fails to treat said activated polymeric material produced in the step with a hydrophilic polymer under conditions effective to produce said modified polymer, the presence of catalysts or initiators.

The chemical structure of the product obtained in the Young, Sr. et al's method is composed of only fibers coated or adhered to each other with a polymer binder. On the other hand, as described above, in accordance with the present invention hydrophilic polymer chain is chemically bound to the functional groups in the activated surface of the polymeric material with a considerable number of binding points.

The attached Declaration at pages 5-6 thereof, support the belief that Young, Sr. et al. simply involves an adhesion as opposed to chemical bonding. Consequently, the rejection of the claims based on Young, Sr. et al. are respectfully requested to be withdrawn.

The Office Action next rejected claims 28-46, 48-53, 55-57 and 59 under 35 U.S.C. §103(a) as allegedly being unpatentable over U.S. Patent No. 6,358,557 to Wang et al. (hereinafter referred to as "Wang et al.") in view of Ikada et al. In response to the rejection, applicant notes that the method of Wang et al. involves exposing a substrate to an initiator in solution capable of initiating a graft polymerization reaction on the substrate, to generate reactive radical sites on the surface of the substrate, contacting the exposed substrate having reactive radical sites with a composition comprising one or more monomers in a medium which has reversed phase properties compared to the substrate, in terms of hydrophilicity

and further comprising a solute in an amount sufficient to induce a salting-out effect, and graft polymerizing onto the substrate by forming covalent bonds between monomer molecules and the substrate at reactive radical sites on the substance surface.

Although Wang et al.'s involves a graft polymerization with initiators, as the attached inventor's Declaration demonstrates at pages 6-7 thereof, Wang et al. does not teach an activation step and a monomer grafting after a hydrophilic treatment. This is critical to the present invention and the difference between the two is clearly shown by Comparative Example 12 and Example 38.

The arguments submitted above concerning Ikada et al. are reiterated here by reference thereto. It is respectfully submitted that neither Wang et al. nor Ikada et al, alone or in combination render the present invention obvious. Applicant consequently requests that the rejection of these claims be withdrawn.

Claims 28-46, 48-53, 55-57 and 59 were next rejected under 35 U.S.C. §103(a) as being unpatentable over Valint et al. or Grobe III et al. in view of Ikada et al. The Examiner alleged that it "would have been obvious to one skilled in the art at the time of the invention to employ the material taught by Ikada et al. as the substrate for graft polymerization by the method disclosed by Valint et al. or Grobe, III et al. One of ordinary skill in the art at the time of the invention would have been motivated by a reasonable expectation of successfully providing a useful coated medical product. Valint et al. and Grobe, III et al. each provide motivation by teaching that a variety of substrates are suitable for the method of graft polymerization disclosed. Ikada et al. provide motivation by teaching a polymeric material useful for preparing a medical device."

Applicant respectfully disagrees with the conclusions drawn by the Examiner. Both Valint et al. and Grobe, III et al. refer to an activation process such as plasma and corona discharge treatments as a pretreatment of a polymer substrate. However, neither disclosure give an appropriate condition applicable for the modification of polymer materials. When

these activation processes are carried out too far, the physical strength of the substrate can be weakened. On the other hand, when the activation is carried out in only a trace extent, the subsequent treatment provides no effective results.

Neither Valint et al. nor Grobe, III et al. disclose step (b) of the present invention after the activation step: a hydrophilic polymer treatment in the presence of catalysts or initiators. Valint et al. make a coating of a carbon-containing layer using a diolefic compound having 4 to 8 carbon atoms on a polymer substrate. In addition, Grobe, III et al. gives a formation of a carbonaceous polymeric surface on a plasma oxidized polymer substrate by a plasma polymerization in a hydrocarbon atmosphere. Therefore, both provide products coated with hydrocarbon polymers which should be hydrophobic. As the present invention provides in step (b) a hydrophilic polymer treatment in the presence of catalysts or initiators, there is a clear difference between the structure of the products of the prior art from that of the present invention.

Both Valint et al. and Grobe, III et al. do not disclose the use of catalysts or initiators in the monomer grafting step after the step (b) of the present invention. Thus, the method of these references is different from the method of the present invention. As a result, the durable hydrophilic property, water absorption property and adhesive property provided in the products of the present invention cannot be expected in the products made by the processes disclosed by the prior art. Add to this the arguments already submitted regarding Ikada et al. and the rejection based on the combination of these references must be withdrawn.

The Office Action next rejected claims 28-46, 48-53, 55 and 56 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,453,467 to Bamford et al. (hereinafter referred to as "Bamford et al.") in view of Ikada et al. The Office Action alleged that "[o]ne of ordinary skill in the art at the time of the invention would have been motivated by a reasonable expectation of successfully providing a useful coated medical product. Bamford

et al. provide motivation by teaching that a variety of substrates are suitable for the method of graft polymerization disclosed. Ikada et al. provide motivation by teaching a polymeric material useful for preparing a medical device."

Applicant respectfully disagrees. Bamford et al. describe many types of polymer substrates, many kinds of monomers, initiators and activation processes, all of which are generally well known, although all of the examples in the patent give only a grafting of specific monomers to a selected polymer. Bamford et al. do not teach or suggest appropriate conditions for the activation process which is important to obtain a product having a durable property and a practical strength for use. Bamford et al. teaches the laying down of a subbing layer of a subbing polymer on a polymer substrate before a graft polymerization. The subbing polymer is selected from the group consisting of halogenated polyethylene imines, poly(hydroxyalkyl(alk) acrylate and poly(trialkosily-alkyl(alk)acrylate). Most of these polymers are hydrophobic and the method is only subbing of a polymer onto a polymer substrate. In the present invention, the hydrophilic polymer treatment is a type of chemical reaction which is carried out for several hours at a considerably high temperature in the presence of catalysts or initiators after confirming the extent of the activation step of the polymer material. Thus, the binding between the hydrophilic polymer and the substrate in the present invention should be much larger than the polymer subbing of Bamford et al. Furthermore, Bamford et al. did not give the combination of the steps such as taught by the present invention.

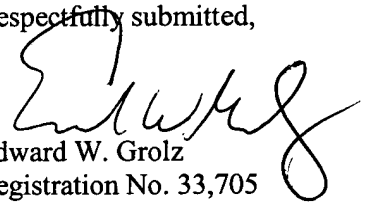
To illustrate the above argument, experiments were conducted in order to compare the effect of the method taught by Bamford et al. (see Comparative Example 13 of the attached Declaration) and the method according to the present invention (see Example 39 of the attached Declaration). As is shown by the Declaration, the obtained specimen made in accordance with Bamford et al. did not give an apparent wettability to water while the obtained polypropylene film obtained by the present invention gave a good adhesion

property with a PVA glue. The comparative test results support the fact that the Bamford et al. method is different from that of the present invention. That is, the durable modified properties such as hydrophilic property, water absorption property and adhesive property obtained by the present invention can not be obtained with the method as taught and/or suggested by Bamford et al.

The disclosure of Ikada et al. do not overcome the deficiencies of Bamford et al. Accordingly, it is respectfully submitted that the claims of the present invention are patentable over the cited art and it is requested that the rejection of the claims based on Bamford et al. in view of Ikada et al. be withdrawn.

Finally, it is further submitted that all the claims in the application as presently submitted contain patentable subject matter and a Notice of Allowance is earnestly solicited.

Respectfully submitted,



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